

## 1.4 Linear and Quadratic Functions

Degree of a polynomial:

- ⇒ is the greatest sum of the exponents in any one term  
 ie:  $5x^2 + 3x + 7$  degree 2

(HINT: decide on the degree when equation is in standard (expanded) form)

Linear Fn.	Quad Fn.
⇒ • Common first difference ***both depend on a constant increment of the independent variable (x).*** ⇒ • The degree is 1 ⇒ • Graphically is a straight line	• Common 2nd difference • The degree is 2 • Graphically is a curve (parabola)

## Ex 1

Determine if the function is linear, quadratic or neither.

a)  $f(x) = -x^2 - 12x - 3$

Quadratic  
Degree 2

b)  $3x + y = 5$

Linear  
Degree 1

c)  $f(x) = 2x^3 - 5$

Neither

d)  $f(x) = 2^x$

Neither  
exponential

d)  $f(x) = \frac{1}{x}$

Neither  
 $= x^{-1}$ 

## Ex 2

Determine if the function is linear, quadratic or neither:

a)

x	y
0	5
1	2
2	-1
3	-4
4	-7

$\Delta y$   
 $2-5 = -3$   
 $-1-2 = -3$   
 $-4-(-1) = -3$   
 $-7-(-4) = -3$   
 Linear (constant)

b)

x	y
0	1
1	2
2	4
3	8
4	16

$\Delta y$     $\Delta^2 y$   
 $2-1 = 1$     $2-1 = 1$   
 $4-2 = 2$     $4-2 = 2$   
 $8-4 = 4$     $8-4 = 4$   
 $16-8 = 8$     $16-8 = 8$   
 Neither

## Ex 2 - Continued

Determine if the function is linear, quadratic or neither:

c)

x	y
0	0
2	1
4	4
6	9
8	16

Quadratic

Ex3: Write the equations in function notation, create a table of values, then graph the following functions:

a)  $y = 2x - 4$

Function notation:

x	f(x)
-1	-6
0	-4
1	-2
2	0

$$f(x) = 2x - 4$$

$$= 2(-1) - 4$$

$$= -2 - 4$$

$$= -6$$

Notice degree and type of fn:

- degree 1
- common 1<sup>st</sup> difference of 2
- linear

b)  $h = 2t^2 - 4$

t	h(t)
-1	-2
0	-4
1	-2
2	4

$$f(x) = 2t^2 - 4$$

$$-4 - 2 = -2$$

$$-2 - 4 = -6$$

$$-2 - 2 = -4$$

$$4 - 2 = 2$$

$$2 - 4 = -2$$

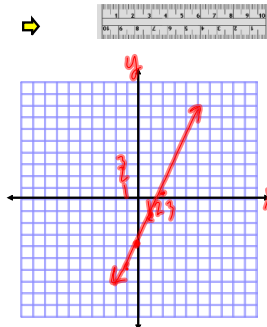
$$4 - 2 = 2$$

- degree 2
- common 2<sup>nd</sup> difference of 4
- quadratic

• common 1<sup>st</sup> difference of 2  
• quadratic

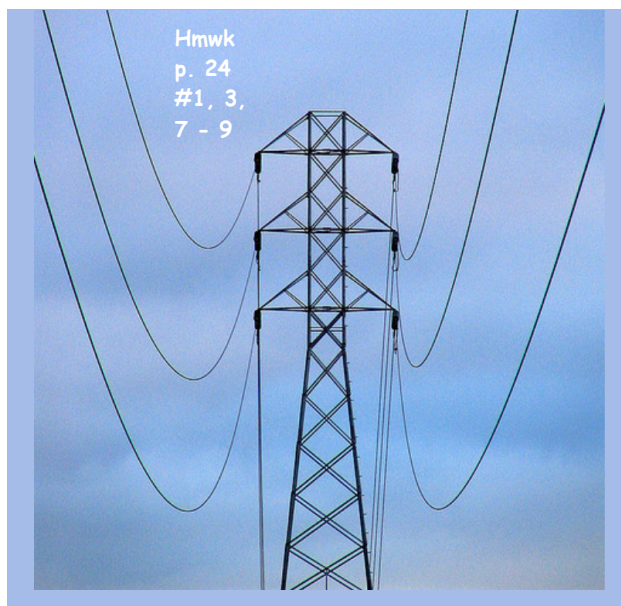
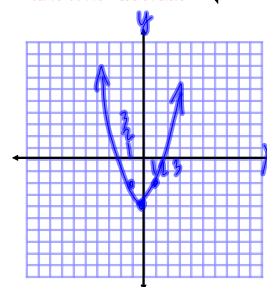
x	f(x)
-1	-5
0	-4
1	-2
2	0

linear use a ruler!



t	h(t)
-1	-2
0	-4
1	-2
2	4

curve-do NOT use a ruler!



Hmwk  
p. 24  
#1, 3,  
7 - 9